International Journal of Research in Engineering, Science and Management
Volume 4, Issue 7, July 2021
https://www.ijresm.com | ISSN (Online): 2581-5792

Weapon Detection Using Artificial Intelligence and Deep Learning for S Application

P. Srinivas Babu[1], H. D. Sudarshan[2*], B. L. Rakesh Gowda[3], P. Sujan[4], Suresh Mallappa Aldi[5]
[1]*Associate Professor, Department of Electronics and Communication Engineering, East West Institute of Technology, Bangalore, India*
[2,3,4,5]*Student, Department of Electronics and Communication Engineering, East West Institute of Technology, Bangalore, India*

***Abstract*: Now-a-days, many cases of crimes are report in public place, home using different types of weapons such as firearms, swords, cutters, etc. To monitor and minimize such types of crimes, CCTV camera is installed in public places. Generally, the video footages recorded through these cameras are monitored by security staff. Success and failure of detecting crime depends on the attention of operator. It is not always possible for a person to pay attention on all the video feeds on a single screen recorded through multiple video cameras. Nature and extent of crime depends on the types of weapon that is used. As a result, anomalies are influenced by the phenomena of interest. Object detection recognizes instances of several categories of objects using feature extraction and learning techniques or models The proposed implementation focuses on detecting and classifying guns accurately.**

***Keywords*: CCTV, CNN.**

1. Introduction

Now-a-days, many cases of crimes are report in public place, home using different types of weapons such as firearms, swords, cutters, etc. To monitor and minimize such types of crimes, CCTV camera is installed in public places. Generally, the video footages recorded through these cameras are monitored by security staff. Success and failure of detecting crime depends on the attention of operator. It is not always possible for a person to pay attention on all the video feeds on a single screen recorded through multiple video cameras. Nature and extent of crime depends on the types of weapon that is used. As a result, anomalies are influenced by the phenomena of interest. Object detection recognizes instances of several categories of objects using feature extraction and learning techniques or models The proposed implementation focuses on detecting and classifying guns accurately.

2. Problem Description

To design and implement an efficient system to detect the weapon in the surrounding Area.

Input: Image containing weapon.

Process:

- The processing consists of identification of the individual component part of the weapon by using CNN algorithm.
- After identification if any weapons are found that will be detected.

Output: Display weapon type when weapon detected.

3. Literature Review

The literature review attempts to discuss the work carried out in the weapon detection process using AI and machine learning.

Weapon detection using artificial Intelligence and deep learning for security applications; Harsha Jain ICESC 2020.

Security is always a main concern in every domain, due to a rise in crime rate in a crowded event or suspicious lonely areas. Abnormal detection and monitoring have major applications of computer vision to tackle various problems. Due to growing demand in the protection of safety, security and personal properties, needs and deployment of video surveillance systems can recognize and interpret the scene and anomaly events play a vital role in intelligence monitoring. This paper implements automatic gun (or) weapon detection using a convolution neural network (CNN) based SSD and Faster RCNN algorithms. Proposed implementation uses two types of datasets. One dataset, which had pre-labelled images and the other one is a set of images, which were labelled manually.

Automatic handgun and knife detection algorithms; Arif Warsi IEEE Conference 2019.

Nowadays, the surveillance of criminal activities requires constant human monitoring. Most of these activities are happening due to handheld weapons mainly pistol and gun. Object detection algorithms have been used in detecting weapons like knives and handguns. Handgun and knives detection are one of the most challenging tasks due to occlusion, variation in viewpoint and background cluttering that occurs frequently in a scene. This paper reviewed and categorized various algorithms that have been used in the detection of handgun and knives with their strengths and weaknesses. This paper presents a review of various algorithms used in detecting handguns and knives.

*Corresponding author: sudarshanhd2018@gmail.com

Weapon classification using deep Convolutional neural networks; Neelam Dwivedi IEEE Conference CICT 2020.

Increasing crimes in public nowadays pose a serious need of active surveillance systems to overcome such happenings. Type of weapon used in the crime determines its seriousness and nature of crime. An active surveillance with weapon classification can help deciding the course of action while identifying the possibilities of any crime happening. This paper presents a novel approach for weapon classification using Deep Convolutional Neural Networks (DCNN). That is based on the VGG Net architecture. VGG Net is the most recognized CNN architecture which got its place in Image Net competition 2014, organized for image classification problems. Thus, weights of pre-trained VGG16 model are taken as the initial weights of convolutional layers for the proposed architecture, where three classes: knife, gun and no-weapon are used to train the classifier. To fine tune the weights of the proposed DCNN, it is trained on the images of these classes downloaded from internet and other captured in the lab achieved for weapon classification.

Handheld Gun detection using Faster R-CNN Deep Learning; Gyanendra Kumar Verma IEEE Conference 2019.

In this paper we present an automatic handheld gun detection system using deep learning particularly CNN model. Gun detection is a very challenging problem because of the various subtleties associated with it. One of the most important challenges of gun detection is occlusion of gun that arises frequently. There are two types of occlusions of gun, namely gun to object and gun to site/scene occlusion. Normally, occlusions in gun detection are arises beneath three conditions: self-occlusion, inter-object occlusion or by background site/scene structure. Self- occlusion arises when one portion of the gun is occluded by another.

4. Proposed System Architecture

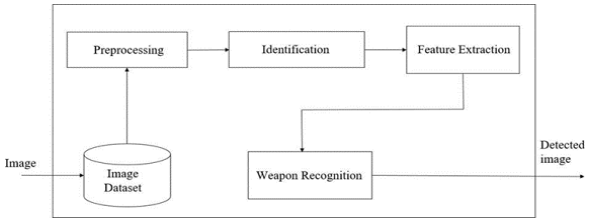

Fig. 2. System architecture of the weapon detection

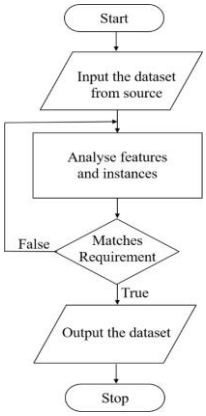

Fig. 2. Flowchart for the module

The flowchart for collecting data is as depicted in the figure 2. The data set is collected from a source and a complete analysis is carried out. The image is selected to be used for training/testing purposes only if it matches our requirements and is not repeated.

5. Results

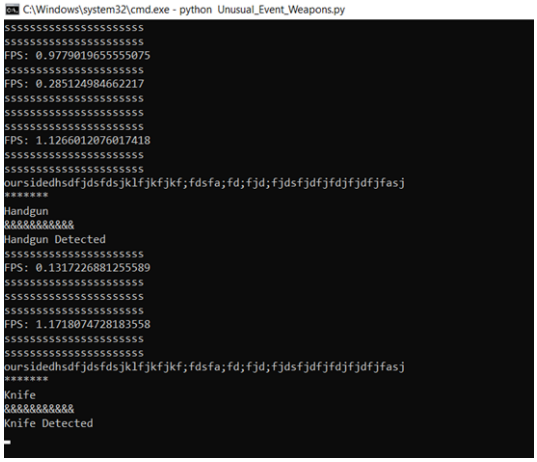

Fig. 3. Experimental results

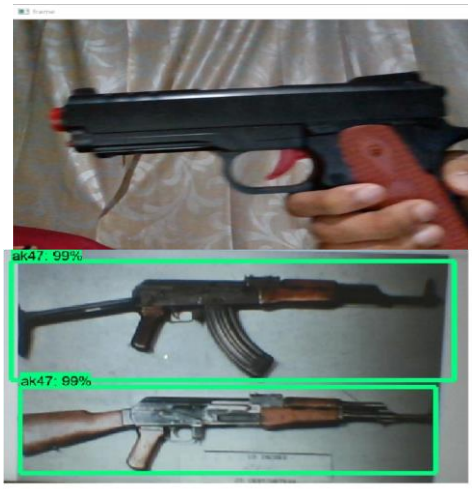

Fig. 4. Gun detected images

Fig. 5. Knife detected images

6. Conclusion

The accuracy and sensitivity in the identification and classification of weapon detection are high, the project's outcomes have been good. The information contained in weapon photos has shown to be as useful as the pre-processing procedures employed to limit the amount of data input during categorization. The goal of developing these subsystems was to be able to use them Only the important data: the pixels around

the locations that, based on their intensity, may be weapons. Even though it is not widely used, the usage of a CNN in input images of three deep dimensions has been created and performs well. Its main disadvantage is that it requires more input data, which increases the number of parameters that must be taught in the CNN.

7. Future scope

Because this model simply detects the weapon's name, it can be improved in the future by adding more features such as the weapon's count if we provide more than one weapon. It can be improved even more by using the bounding box to define the weapon's name within the image itself. It can be improved by identifying the weapon using a live image, which can then be used in a CCTV system. for the purpose of detecting the weapon This suggested method detects weapons of the same type in a single image and can be improved in the future to recognize the names of many types of weapons in a single image.

References

[1] Harsha Jain et.al. “Weapon detection using artificial Intelligence and deep learning for security applications” ICESC 2020.
[2] Arif Warsi et.al “Automatic handgun and knife detection algorithms” IEEE Conference 2019.
[3] Neelam Dwivedi et.al. “Weapon classification using deep Convolutional neural networks” IEEE Conference CICT 2020.
[4] Gyanendra Kumar Verma et. al. “Handheld Gun detection using Faster R-CNN Deep Learning” IEEE Conference 2019.
[5] Abhiraj Biswas et.al. “Classification of Objects in Video Records using Neural Network Framework,” International conference on Smart Systems and Inventive Technology, 2018.
[6] Pallavi Raj et.al. “Simulation and Performance Analysis of Feature Extraction and Matching Algorithms for Image Processing Applications” IEEE International Conference on Intelligent Sustainable Systems, 2019.
[7] Mohana et.al. “Simulation of Object Detection Algorithms for Video Survillance Applications”, International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud), 2018.
[8] Glowacz et.al. “Visual Detection of Knives in Security Applications using Active Appearance Model”, Multimedia Tools Applications, 2015.